

Installation of the 4 main steel trusses for the extension of the Anoeta Football stadium, San Sebastian - Spain.

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ABSTRACT

SARENS was at the Anoeta football stadium for an important roof extension. The project features a new covered seating. SARENS performed tandem lifts of four new steel trusses, each weighing 400t and measuring up to 156 metres long. In addition, SARENS also lifted four smaller cantilever trusses. The operation depended on two Superlift 3800 lattice boom crawler cranes in SWSL configuration. The cranes were chosen for their ability to handle heavy loads while manoeuvring around a limited job site, since SARENS had to share the available working area around the stadium with several other subcontractors.

KEYWORDS: Tandem lifting, cranes, extension football stadium, girders.

1. Introduction

On summer 2017 SARENS was on site in San Sebastián (Spain) at the Anoeta football stadium for an important roof extension.

The project is spearheaded by the San Sebastian Council and features a new covered seating area that will make it possible for even more fans to watch matches there.

To make the roof extension possible, SARENS performed tandem lifts of four new steel trusses, each weighing 400t and measuring up to 156 metres long. The trusses have a triangular cross section 8 m width at the base and 8,75m height. In addition to the main girders, SARENS also lifted four smaller cantilever trusses.

2. Selection of equipments

The operation depended on two Superlift 3800 lattice boom crawler cranes in SWSL configuration.

The cranes were chosen specifically for their ability to handle heavy loads while manoeuvring around a limited job site: each crane can bear a load of 201 tonnes and has a maximum working radius of 54 metres.

This was an important consideration, since SARENS had to share the available working area around the stadium with several other subcontractors.

3. Arrangement of equipments

The cranes' main parts were transported by sea vessel and delivered to a harbour near the work site. Then, up to 100 trucks delivered the equipment to the stadium, located in the middle of the city.

As the reader can imagine, that was a huge logistic work to coordinate all these transports to the center of one of the most tourist and well known Spanish cities and, even more, during the summertime.

Once on site, it took approximately a week and a half to rig each crane, and most of the rigging was performed at night to avoid interfering with other subcontractors and local city transport.

4. Performance

Up to four crew members worked together during each lift, raising the steel trusses in tandem. Because it was crucial to achieve an accurate bolting connection between girders, the final two lifts presented a challenge as the two previous (North and South trusses were already at their final positions). The crew had to ensure that each of the girders exactly matched the two that came before.

5. Lifting of the North Truss:

On the following pictures the reader can see a sequence of pictures showing how the first of the four trusses was installed (North one).



Figure 1: Initial position of the cranes for taking the load.



Figure 2: Intermediate position of the cranes with the truss still out site the stadium.



Figure 3: Intermediate position with the hook of one crane (left) already inside the stadium.



Figure 4: Final position.

5. Lifting of the last and West Truss:

The main reason why these types of cranes were selected was that for the installation of the West Truss the required crane in its south corner outside the stadium was constricted among the mountain at the side of the stadium and all the civil constructions surround it. A smaller crane at this spot was not strong enough, and a bigger one was not fitting in the available area.

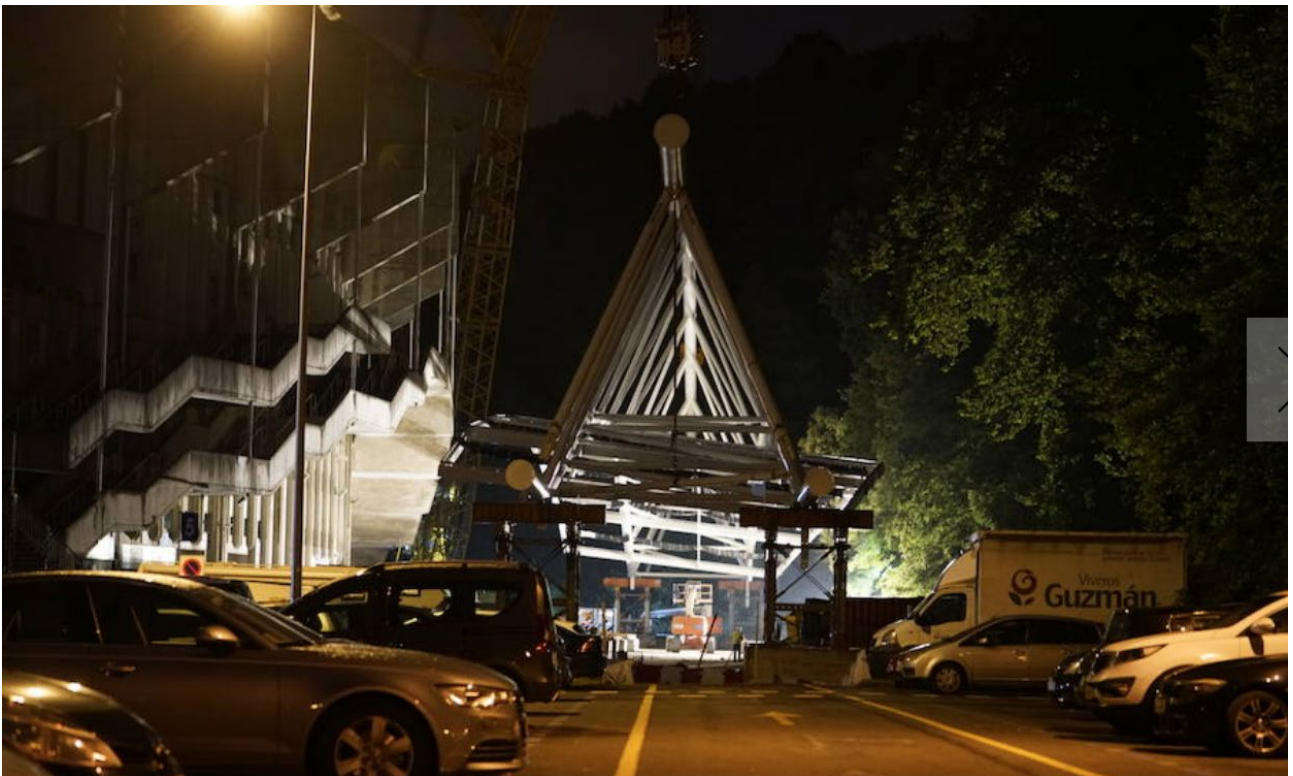


Figure 5: Initial position of the truss still resting at road level. Starting at dawn.

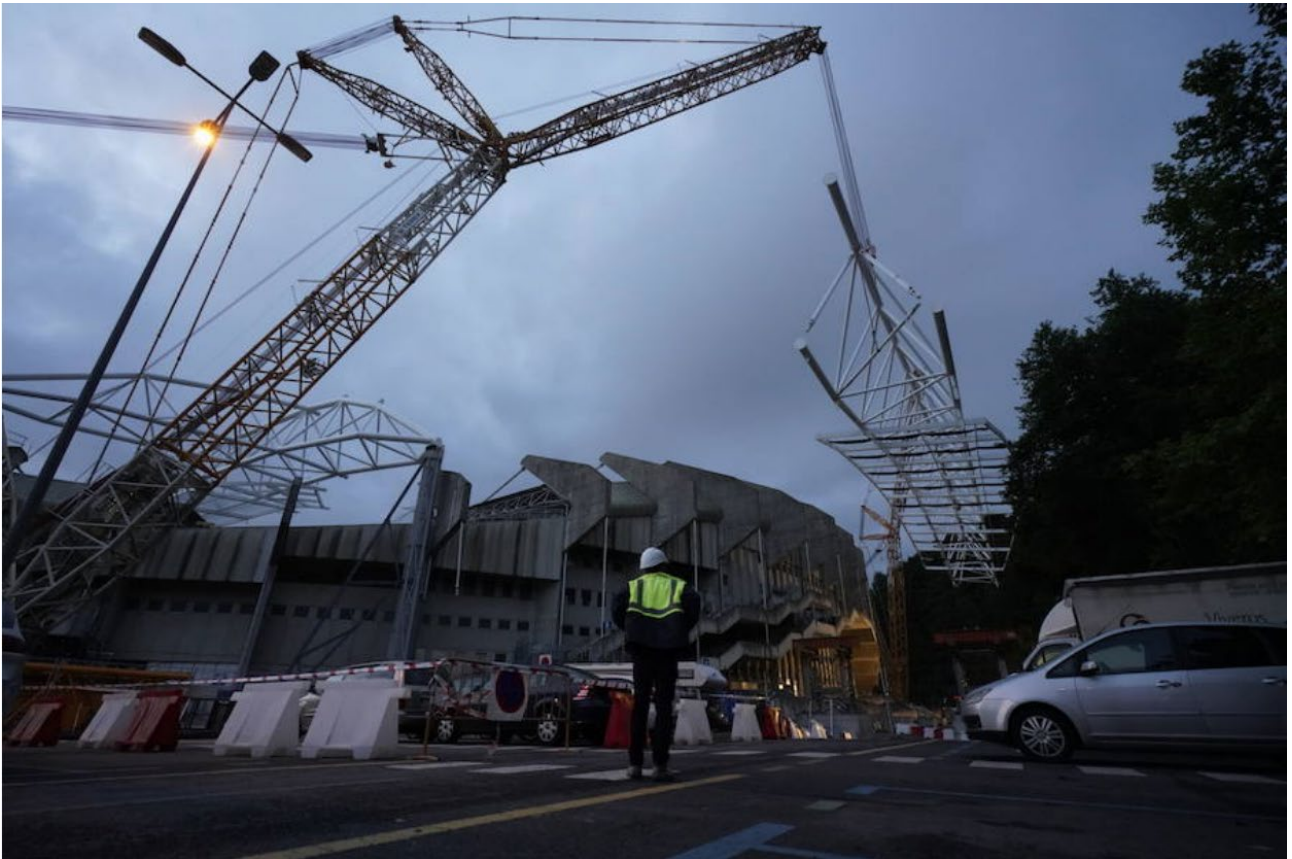


Figure 6: Intermediate position of the cranes with the truss still out site the stadium.



Figure 7: Intermediate position with the hook of one crane at the left already inside the stadium.

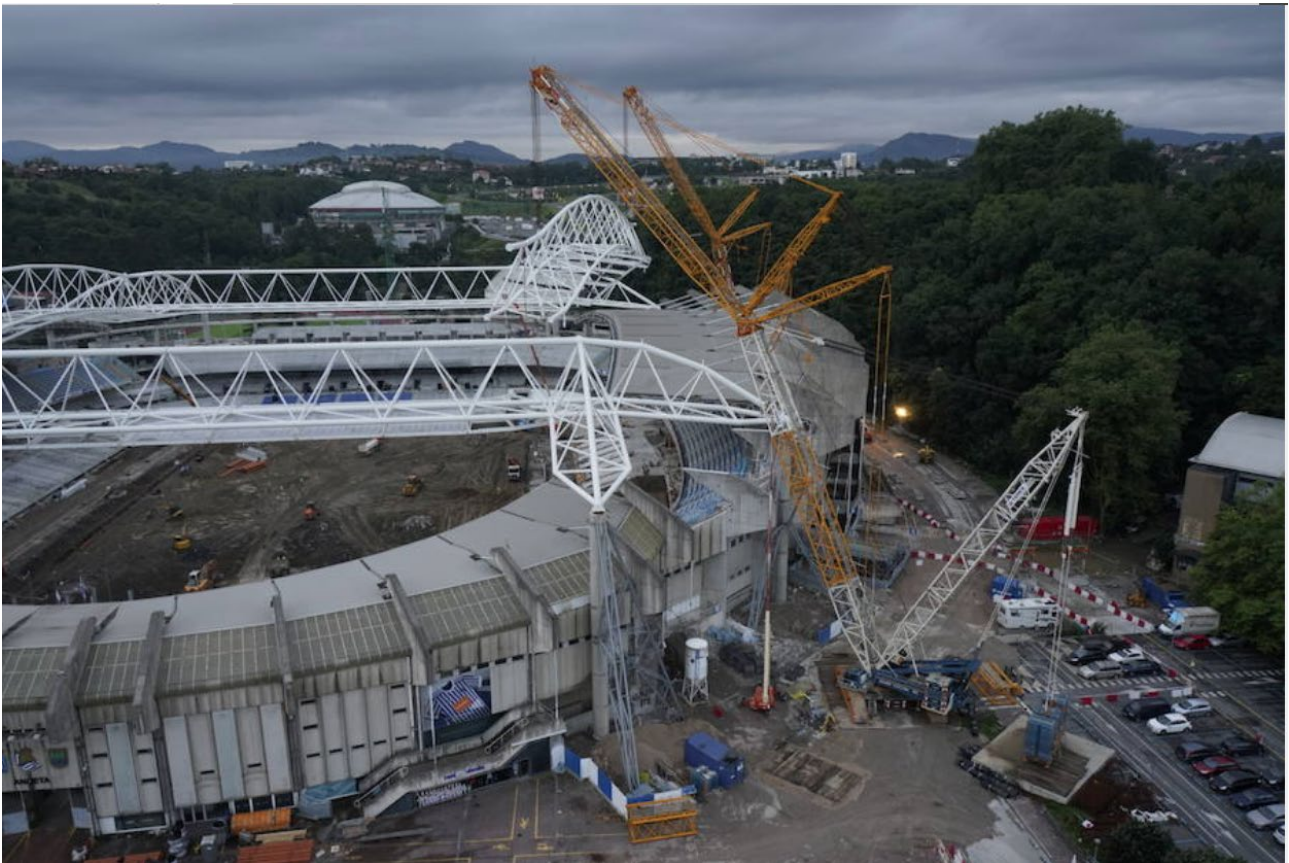


Figure 8: Intermediate position with hooks of both cranes already inside the stadium.



Figure 9: Inside view from the pitch right before final position. Also, visible other subcontractors working to lower the level of the pitch so the new seats over the former athletic truck can see it.



Figure 10: Final position. General view of the stadium with the 4 new trusses already installed.

5. Relocation of the cranes among the different lifting positions:

One of the most complicated and difficult task during all these liftings, was how to manage the relocation of the two cranes among these four liftings.

Due to the tied schedule and big amount of subcontractors working at a time in and all around the stadium, it was decided to relocate these cranes to their next positions without disassembling almost anything but the super weight ballast.

These crawling were performed also during the nights as the public roads had to be cut and the traffic deviated to other areas. It took several nights to crawl among the different final crane positions and for one of these movements one crane had to crawl for almost 1 km turning around both stadiums.

Although it was also a remarkable manoeuvres by themselves, moving these cranes by their own without the need to disassemble allowed SARENS to achieve the tied site schedule and helped the rest of the site/subcontractors to perform their jobs with the minimum interferences.

The normal way of disassembling both cranes every time, load them of trailers, drive them around the stadiums and reassemble them again should have meant for sure delays to the client,

Acknowledgements

This operation was performed on behalf of joint venture client ANOETA ENOLVENTE, which is composed by the companies ALTUNA Y URIA and CONSTRUCCIONES MOYUA. SARENS wants to thank the trust and confidence showed by these companies for awarding this job to us.

SARENS is pleased to have been part of such an ambitious project, and would like to congratulate everyone who helped make it a success from the safety point of view till fulfilling the tied schedule, passing by a very complicated technical liftings.